

## The Builder.

NO. LVIII.

SATURDAY, MARCH 16, 1844.



HAVING received, through the favour of the Right Honourable the Earl of Lincoln, sooner than we expected, a copy of the Bill now before the House of Commons, for the proposed New Metropolitan Building-Act, we here, from the urgent importance of the subject to all builders, architects, proprietors, and inhabitants, of not only London and its vicinity, but also to very many persons throughout the empire at large, have been compelled to lay aside many subjects, and to postpone the appearance of numerous valuable articles already set up in type. We made accurate calculations of the extent of space which would be required for containing the whole of this most voluminous Bill, with the requisite annotations thereon. At first we endeavoured to arrange the whole within the extent of one Number of our periodical, with a Supplement, but we soon found, that even with the use of almost the smallest readable type, there was little hope of compressing the whole Bill within less than the extent of two Numbers; we have, therefore, been obliged not only to give a double Number, but also to add a Supplement, or we should otherwise not have had any space left for subjects of general interest. It has, indeed, required very great exertion to lay before our readers, upon notice so short, such an extent of technical matter; and we trust such of them as may be less interested in the measure will nevertheless bear with the suppression of other matter, which has this week of necessity resulted from our prompt attention to a subject of such great and absorbing importance to the metropolis, and which, if once brought to any near approach to perfection, will not doubt form the model for enactments as nearly as practicable similar thereto, to be extended to every principal town throughout the three kingdoms.

In the notes, parallel with the clauses of the body of the proposed Act, will be found numerous critical observations. We have set up more than three dozen columns of similar notes, applicable to the voluminous schedules appended to the Bill, in which indeed lie more of the nerves and sinews of the proposed Act than to its great body of clauses; but, to our extreme regret, although we this week reach twelve columns beyond the extent of a double Number, we have been unable to find room for these exact and important observations; we shall, therefore, be compelled to give them in our next publication, with such further remarks as a week's additional deliberation will produce.

In the meanwhile, we have no hesitation in

saying that the measure as a whole is calculated to effect much good. It is true, that in some of its details it is inferior both to the present Building-Act and to the one proposed last year; but then it is in many particulars very much superior to both of them; and we hope that no officious obstinacy from any quarter will defeat the consummation of a measure calculated, when improved, corrected, and modified, to effect so much sterling benefit.

Building-Acts seem to have been the terror of lawyers; and, perhaps, the present existing metropolitan statute is, though of so much importance, less understood by members of the legal profession than almost any other parliamentary enactment; notwithstanding also, perhaps, this public statute is of such general concern, and is in parts difficult to expound, there are in law books fewer reports of cases decided upon points relative to it than upon any other important Act. Men of the law, indeed, appear always to have grown seditious and inattentive under building technicalities. Hence has arisen that whenever any proposal for a new Metropolitan Building-Act has appeared, there has not in general been apparent that verbal dexterity, that freedom from ambiguity, that terseness of expression, that absolute barrier against even torturing the language into any signification other than the one plainly and even palpably intended to be conveyed by the words which should be found in every good and carefully framed statute, and in which labour few besides lawyers are indeed commonly adept.

## BRIEF.

A COMMITTEE OF THE SOCIETY OF MASTER CARPENTERS is summoned for Monday next, at 12 o'clock, to take into consideration the several clauses in the New Metropolitan Building-Act.

DESCRIPTION OF A CAST-IRON BRIDGE, COMPLETED IN THE YEAR 1840, FOR CARRYING THE BIRMINGHAM AND GLOUCESTER RAILWAY OVER THE RIVER AVON, NEAR TEWKESBURY.

BY CAPTAIN W. S. WOODS.

(Read before the Institution of Civil Engineers, January 9.)

This bridge is situated about seven miles north of Tewkesbury; the approaches to it are formed on embankments about 25 feet high, crossing the valley nearly at right angles. In the construction it was desirable to provide for the effect of considerable floods, by aiding the egress of the water, and also to avoid any interference with the navigation of the river; a greater width of water-way was therefore given, than at first view may appear necessary.

The bridge consists of three segmental arches, each of 57 feet span, with a varied size of 8 feet 3 inches; the length between the centres of the piers being 66 feet 6 inches; the total width between the abutments 150 feet 6 inches; and the breadth of the cutwaters 8 feet 6 inches each, leaving a clear water-way of 173 feet 6 inches.

The principal novelty in the work is the method of constructing the two piers. They are formed externally of cast-iron plates or raisons, filled for the first 12 feet from the bottom with solid masonry and concrete; upon this is built hollow masonry to support the cap-plates, carrying eight pillars on each pier, with an entablature for receiving the ends of the arches, which, with the caps, pillars, and entablature, are of cast-iron. The abutments at either end are of masonry.

The raisons are, at the bottom, 41 feet 6 inches long, and 16 feet wide, with semicircular ends, tapering upwards for 12 feet, on all sides, to 34 feet 5 inches long, by 8 feet 6 inches wide, from whence they rise perpendicularly for the remaining 8 feet 9 inches. They are constructed of cast-iron flanchéd plates, 1 inch thick, screwed together by bolts,

and the joists made with iron cement. The total weight of each caisson is about 26 tons.

The bottom of the river, at the site of each pier, having been prepared by a scow dredger, worked from a platform erected upon piles, the lower row of plates for the caisson was put together and suspended in the water by iron rods while the other rows were added, gradually lowering the whole as the work proceeded, until the bottom rested on the bed of the river; a quantity of clay was then thrown round the outside, which formed a joint as impervious to water, that with two pumps, each of 5½ inches square, the caisson was emptied in six hours, and was afterwards kept dry by one pump, which was worked occasionally during the subsequent excavations at the side of the caisson.

The dimensions of the cast-iron work of the arches, and the masonry of the abutments, are given in detail, with an account of the methods of construction followed, and of the materials employed.

It is stated that these iron caissons, which are proposed by Mr. Ward of Falmouth, the resident engineer, were found to be cheaper than being enfilade and stone piers. The total cost of the bridge, including iron-work, painting, masonry, subsequent repairs to the walls, and superintendence during construction, being 10,192*l.*, and the weight of cast and wrought iron employed was about 520 tons.

The partial failure of an arch in one of the abutments is described, and the supposed reasons for the sinking are given, with the means which were adopted for replacing those stones which had been displaced, and it is stated that no sinking has since occurred.

The paper was illustrated by eighteen remarkably well-executed drawings by Mr. Butterton.

Captain Woods said that there were a few interesting particulars relative to the bridge, beyond those which were given in the paper. Mr. Murchison showed, in his work on the Geology of the Silurian districts, that the deposits of gravel of the Lickey range of the hills occur in Birmingham, and that of the Avon near Pershore, were, geologically speaking, identical; but Captain Woods found that, as regarded the engineer's operations, they differed in character.

The gravel in the neighbourhood of Birmingham was remarkable for the rusty red character of the stones composing it, a circumstance which was considered as a peculiarity of this bridge consisted almost entirely of angular stones, which were used without any admixture of sand, for making concrete, which was found to become most compact when the stones were perfectly clean; and the Birmingham gravel required a certain proportion of sand with it, to make compact concrete.

In excavating for the foundations of the abutments, several bones of deer and a human skull were found, at depths from 10 to 11 feet below the level of the bottom of the river.

The circumstances attaching to the partial failure of the small southern abutment arch were peculiar. It had been supposed to arise from expansion of the iron-work taking place all in one direction, but after watching the arch for six months, he thought such an opinion was to a great extent unfounded; and he conceived it to have arisen partly from the abutment wall having slightly sunk at the back, owing to the great quantity of rain which fell at that period affecting the spongy soil upon which it was built.

For seven months, the valley of the Avon, at the spot in question, was (with a very few days' intermission) under water, immediately after the walls had been built, and before the bridge was nearly completed. An amount of leakage, which was scarcely perceptible in the back of the foundation of the wall, would have the effect of displacing the stones of the arch to the extent of some inches, and it was in this cause that he attributed the separation of the arch stones. As soon as the settlement appeared to have ceased, the defective stones were taken out and replaced, without interrupting the passage of the train.

The north-eastern wing wall also failed from the same cause, viz. the spongy nature of the soil when it was thoroughly saturated with water; and if this had been foreseen, prevention would have been easy, by placing